

## **Appendix 9: Documentation of Consistency with Aquatic Conservation Strategy Objectives of the Plentywater Creek Project Timber Harvest Alternatives**

**ACS Objective 1.** Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

**Alternative 1:** The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. **Does not retard or prevent the attainment of ACS Objective 1.**

**Alternative 2:** Thinning would maintain and help increase (restore) diversity and complexity by encouraging development of understory species and growing larger trees. Approximately 40 acres of thinning within RR would help **restore** species composition and structural diversity by promoting development of grass, forb, shrub and understory tree development, and increased individual tree growth resulting from this treatment would allow some trees to express dominance over others, enhancing the development of vertical structure in the stand as well (WA, p. 111). Leaving portions of RR untreated would increase diversity by providing a contrast to the treated portions. For example, thinned portions will provide larger trees sooner while the unthinned portions will provide more, but smaller snags through time. The protection of the aquatic system will be ensured through very little thinning in RR, no-cut buffers on all streams (100 feet on fish bearing and 50 feet on non-fish bearing), and no new road construction in RR. **Does not retard or prevent the attainment of ACS Objective 1.**

**Alternative 3:** Generally the same as for Alternative 2. There would be slightly less RR thinning, and 60 acres less overall harvested, but the discussion above is valid for this alternative as well. **Does not retard or prevent the attainment of ACS Objective 1.**

**Alternative 4:** Alternative 4 drops four units from harvest, which would result in 120-150 less acres treated than in Alternative 2. This would maintain more of the watershed in its current condition. The aquatic system would still be protected as described in the Alternative 2 discussion. **Does not retard or prevent the attainment of ACS Objective 1.**

**ACS Objective 2.** Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. The network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian dependent species.

**Alternative 1:** The current condition of connectivity would be maintained. **Does not retard or prevent the attainment of ACS Objective 2.**

**Alternative 2:** A small amount of the RR (approximately 40 acres) within the project area would be thinned, which would increase the quality of the riparian reserve stand habitat by creating some larger trees (WA, p. 111). The connectivity would be maintained within RR. No-cut buffers on all perennial and intermittent streams will ensure that connectivity would be maintained among all drainages by maintaining canopy cover over streams and maintaining connections of RR on federal land (WA, p.109, 111). Some connectivity may be reduced in the short term in upland areas that are to be regeneration harvested (approximately 245 acres), however these areas are scattered throughout the watershed, will be replanted with conifers after harvest, and will have up to 15 trees per acre left standing to serve as wildlife trees, snags and coarse woody debris, all which helps maintain connectivity at the watershed scale. **Does not retard or prevent the attainment of ACS Objective 2.**

**Alternative 3:** Same as Alternative 2. There would be slightly less RR treated, approximately 25 acres, and approximately 60 less acres treated total, but the previous rationale is valid for this alternative. **Does not retard or prevent the attainment of ACS Objective 2.**

**Alternative 4:** Generally the same as Alternative 2 within RR; approximately the same amount of RR would be treated as in Alternative 3 and the same no-cut buffers would be used. However, between 120-150 less acres overall would be treated, and approximately 80 of those acres would have been regeneration harvested under Alternatives 2 and 3, which would lessen overall impacts. Though all three action alternatives meet ACS objectives, this alternative would cause the least amount of disturbance in upland connectivity due to less regeneration harvest. All three action alternatives, however, have approximately the same impacts with regard to the RR. **Does not retard or prevent the attainment of ACS Objective 2.**

**ACS Objective 3.** Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

**Alternative 1:** The current condition of the physical integrity of the aquatic system would be maintained. **Does not retard or prevent the attainment of ACS Objective 3.**

**Alternative 2:** Only a small percentage of the RR (approximately 40 acres) would be treated and no-cut buffers on all perennial and intermittent streams would ensure that the physical integrity of the aquatic system would be maintained (WA p. 109, 111). In unit 27-1 logs would be yarded across a small, non-fish bearing stream, however logs would be fully suspended over the stream and through the no-cut buffer, therefore there would not be any impact on stream banks and bottoms. **Does not retard or prevent the attainment of ACS Objective 3.**

**Alternative 3:** Same as Alternative 2. There will be less acres treated overall, and approximately 25 acres within RR, but the same rationale applies. **Does not retard or prevent the attainment of ACS Objective 3.**

**Alternative 4:** Same as Alternative 2 and 3. There will be less acres treated than either Alternative 2 or 3, and approximately 25 acres within RR, but the same rationale applies. **Does not retard or prevent the attainment of ACS Objective 3.**

**ACS Objective 4.** Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

**Alternative 1:** The current condition of water quality would be maintained. **Does not retard or prevent the attainment of ACS Objective 4.**

**Alternative 2:** Timber harvest activities, including road construction, reconstruction and decommissioning, and yarding and hauling timber, could lead to sediment movement into streams in the short-term. Roads are mainly located on benches and ridgetops, which reduces potential for runoff and sediment movement. Road decommissioning will result in a net reduction of road mileage within the watershed of 5,700 feet (WA p. 109). The Proposed Action is expected to have little to no impact on stream temperatures because of the relatively small amount of RR treated (approximately 40 acres) and no-cut buffers on all streams (50 feet on non-fish bearing and 100 feet on fish bearing streams)(WA p. 109). The reduction in road mileage may help **restore** this objective in the long term. **Does not retard or prevent the attainment of ACS Objective 4.**

**Alternative 3:** This alternative differs from Alternative 2 in that it utilizes more cable logging instead of ground-based in thinning areas, more of the harvest activities would be limited to the dry season, and would result in a net reduction of approximately 10,200 feet of roads within the watershed. More cable yarding should result in less ground disturbance and compaction than the mixture of cable and ground-based systems proposed in Alternative 2. The reduction in road mileage may help **restore** this objective in the long term, and would be more likely to as compared to Alternative 2. The discussion on road location, RR and no-cut buffers on streams is the same as for Alternative 2. **Does not retard or prevent the attainment of ACS Objective 4.**

**Alternative 4:** This alternative would result in less area harvested (120-150 acres less) due to units 15-1, 17-1, 21-2, and 21-3 being dropped. The remaining units could be harvested as described under Alternative 2 or Alternative 3, or a combination, the discussion on impacts to this ACS objective would be the same as described under Alternative 2 and/or 3. The net reduction in road mileage would range from 3,000 feet to 8,000 feet. **Does not retard or prevent the attainment of ACS Objective 4.**

**ACS Objective 5.** Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

**Alternative 1:** The current condition of the sediment regime would be maintained. **Does not retard or prevent the attainment of ACS Objective 5.**

**Alternative 2:** There is a low risk that a small amount of sediment could move from the harvest areas or roads into surface water. If that occurred, the sediment delivery impacts would be small and short term. The probability of sediments entering streams from roads is low due to: 1) the filtering effects of untreated reserves around the streams (WA p. 109); 2) the design features of the roads; and 3) subsoiling many roads upon completion of the project (WA p.109). There would be no new road construction would occur within the RR (WA p.110). Decommissioning roads (approximately 5,700 feet) within the watershed would contribute to the restoration of the sediment regime, and sediment movement into stream channels would be expected to decrease below existing conditions (WA p. 109). **Does not retard or prevent the attainment of ACS Objective 5.**

**Alternative 3:** This alternative reduces the total area harvested by approximately 60 acres, reduces the amount of ground-based logging in thinning area, more of the harvest activities would be limited to the dry season, and would result in a net reduction of approximately 10,200 feet (1.8 miles) of roads within the watershed. More of the harvest accomplished by cable yarding and during the dry season should result in less ground disturbance and compaction than what is proposed in Alternative 2. The reduction in road mileage may help **restore** this objective in the long term, and would be more likely to as compared to Alternative 2. **Does not retard or prevent the attainment of ACS Objective 5.**

**Alternative 4:** This alternative would drop units 15-1, 17-1, 21-2, and 21-3 from harvesting, while the remaining units could be harvested as described under Alternative 2 or Alternative 3, or a combination. This would result in 120-150 less acres overall harvested, approximately 80 acres of which would have been regeneration harvested under Alternatives 2 and 3. Reduction in road mileage could be from 3,000 feet to 8,000 feet, less than under Alternative 3. The reduction in road mileage, whatever the exact amount, would help restore this objective and less acres harvested would also reduce overall impacts. **Does not retard or prevent the attainment of ACS Objective 5.**

**ACS Objective 6.** Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

**Alternative 1:** The current condition of in-stream flows would be maintained. **Does not retard or prevent the attainment of ACS Objective 6.**

**Alternative 2:** The treatment will take place mainly outside riparian reserves and the treatment within riparian reserves is minimal. The road density in the watershed would be slightly reduced by approximately 5,700 feet (WA p. 109). Roads that are removed would be subsoiled, as would landings and compacted areas (i.e. skid trails) within areas that have been regenerated. Subsoiling of roads and other compacted areas may help restore normal patterns of infiltration and subsurface flow of water, therefore may restore timing, magnitude duration, and spatial distribution of flows. **Does not retard or prevent the attainment of ACS Objective 6.**

**Alternative 3:** Generally the same as Alternative 2, except that the net decrease in roads would be greater (10,200 feet), a portion of the areas to be thinned using ground-based equipment would either be cable harvested or dropped from harvesting, and more of the timber harvest activities would occur during the dry season, all which would further reduce the amount of compacted areas following harvest. This alternative would be better than Alternative 2 in protecting and restoring timing, magnitude duration, and spatial distribution of flows. **Does not retard or prevent the attainment of ACS Objective 6.**

**Alternative 4:** This alternative would drop units 15-1, 17-1, 21-2, and 21-3 from harvesting, while the remaining units could be harvested as described under Alternative 2 or Alternative 3, or a combination. This would result in 120-150 less acres overall harvested, approximately 80 acres of which would have been regeneration harvested under Alternatives 2 and 3. Reduction in road mileage could be from 3,000 feet to 8,000 feet, less than under Alternative 3. This reduction in acres treated would lessen overall impacts as compared to Alternatives 2 and 3. **Does not retard or prevent the attainment of ACS Objective 6.**

**ACS Objective 7.** Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

**Alternative 1:** The current condition of floodplain inundation and water tables would be maintained. **Does not retard or prevent the attainment of ACS Objective 7.**

**Alternative 2:** The current condition of floodplain inundation and water tables would be maintained. No ground disturbing activities would occur in meadows and wetlands. Compacted surfaces on adjacent hillslopes would be minimized by adhering to design features and management directives listed in the EA and RMP, and by the subsoiling of landings, skid trails in regeneration harvest units, and decommissioning roads by subsoiling and blocking to traffic (WA p. 109). The road density in the watershed would be reduced by 5,700 feet (0.9 miles). **Does not retard or prevent the attainment of ACS Objective 7.**

**Alternative 3:** Generally the same as Alternative 2, except the net decrease in roads would be greater (10,200 feet), a portion of the areas to be thinned using ground-based equipment would either be cable harvested or dropped from harvesting, and more of the timber harvest activities would occur during the dry season, all which would further reduce the amount of compacted areas following harvest. **Does not retard or prevent the attainment of ACS Objective 7.**

**Alternative 4:** This alternative would drop units 15-1, 17-1, 21-2, and 21-3 from harvesting, while the remaining units could be harvested as described under Alternative 2 or Alternative 3, or a combination. The net reduction in road mileage within the watershed would range from 3,000 to 8,000 feet, less than in Alternative 3. Less acres harvested overall (120-150 acres less) would be expected to result in less impacts to sediment regime than Alternative 2 or 3. **Does not retard or prevent the attainment of ACS Objective 7.**

**ACS Objective 8.** Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

**Alternative 1:** The current condition of plant communities within riparian areas would be maintained. **Does not retard or prevent the attainment of ACS Objective 8.**

**Alternative 2:** No-cut buffers along streams (both perennial and intermittent) will maintain thermal regulation and supply nutrients, LWD, and bank protection (WA p. 109, 111). The thinning within RR may help **restore** species composition and structural diversity within the riparian zone by promoting development of grass, forb, shrub and understory tree development, and increased individual tree growth resulting from this treatment would allow some trees to express dominance over others, enhancing the development of vertical structure in the stand as well (WA p. 111). **Does not retard or prevent the attainment of ACS Objective 8.**

**Alternative 3:** Generally the same as Alternative 2. There will be less acres treated both in RR and outside, however the rationale is the same. There would be little impact to riparian plant communities. **Does not retard or prevent the attainment of ACS Objective 8.**

**Alternative 4:** Generally the same as Alternative 2. There will be less acres treated both in RR and outside, however the rationale is the same. There would be little impact to riparian plant communities. **Does not retard or prevent the attainment of ACS Objective 8.**

**ACS Objective 9.** Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

**Alternative 1:** The current condition of habitat to support riparian-dependent species would be maintained. **Does not retard or prevent the attainment of ACS Objective 9.**

**Alternative 2:** No-cut buffers along streams (both perennial and intermittent) will maintain the habitat for riparian-dependent species. The thinning within RR would also maintain and may help **restore** habitat for riparian-dependent species by promoting development of grass, forb, shrub and understory tree development, and increased individual tree growth resulting from this treatment would allow some trees to express dominance over others, enhancing the development of vertical structure in the stand as well (WA p. 111). Leaving portions of RR untreated would increase diversity by providing a contrast to the treated portions. For example, thinned portions will provide larger trees sooner while the unthinned portions will provide more, but smaller snags through time. Overall there would be little impact on riparian-dependent species. **Does not retard or prevent the attainment of ACS Objective 9.**

**Alternative 3:** Generally the same as Alternative 2. There will be less acres treated both in RR and outside, however the rationale is the same. Overall there would be little impact on riparian-dependent species. **Does not retard or prevent the attainment of ACS Objective 9.**

**Alternative 4:** Generally the same as Alternative 2. There will be less acres treated both in RR and outside, however the rationale is the same. Overall there would be little impact on riparian-dependent species. **Does not retard or prevent the attainment of ACS Objective 9.**

WA = Dairy-McKay Watershed Analysis (BLM, 1999)